

**FACTORS INFLUENCING THE GROWTH OF SMALL-SCALE DAIRY
FARMING: A CASE OF GITHUNGURI CONSTITUENCY, KIAMBU COUNTY,
KENYA**

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DECLARATION

This Research Project Report is my original work and has not been presented for an award of any degree in any other University

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DEDICATION

To my Dad Mr George Githiora and my Mum Mrs. Mary Githiora for their ultimate support and assistance which is highly appreciated. You remain a great inspiration to me.

This research is also dedicated to my younger sister Mercy Nyokabi and niece Melissa Wanjiru to understand that all things are possible. I am a testimony that passion, persistence and hard work pays off.

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ABBREVIATIONS AND ACRONYMS

AI:	Artificial Insemination
CBOs:	Community Based Organizations
CBS:	Central Bureau of Statistics
DFID	Department for International Development
FAO:	Food and Agriculture Organization
GDP:	Gross Domestic Product
GoK:	Government of Kenya
IFPRI:	International food policy and Research Institute
KCC:	Kenya Company Creameries
KDB	Kenya Dairy Board
NAEP:	National Agricultural Extension Policy
NASEP	National Agricultural Sector Extension Policy
SSA:	Sub-Saharan Africa
UNDP:	United Nations Development Program
WHO:	World Health Organization

ABSTRACT

This research sought to investigate factors influencing the growth of small scale dairy farming. The study was carried out in Githunguri Constituency of Kiambu County. Various factors in relation with dairy production in this study included access to credit, access to market, extension services and farmers entrepreneurial skills. This study therefore sought to provide answers to the myriad on farm productivity and management questions that have been rampant especially in central Kenya. The study was guided by 4 questions derived from the study objectives; How does access to credit influence the growth of small scale dairy farming, to what extent does access to market influence the growth of small scale dairy farming, how do extension services influence growth of small scale dairy farming and to what level does farmers' entrepreneurial skill influence the growth of small scale dairy. Empirical literature of the works of widely published scholars was reviewed and clearly presented a research gap for this study. This study was anchored on Wilson's theory. The relationship between study variables was believed to be somewhat influential on growth of small-scale dairy farming. The nexus of interrelationships between study variables has been demonstrated by a conceptual framework configured. The study adopted a descriptive survey design with a target population of 145 comprising of both dairy farmers and agricultural officers in Githunguri constituency. Using the Krejcie and Morgan table for determining sample size, 103 respondents sufficiently constituted the sample size for this study. To achieve a desired representation, both strata and simple random sampling methods were utilized. A questionnaire with both structured and unstructured questions was used. The questionnaire constructed was given to sampled dairy farmers found to be fairly literate. The questionnaire validity was determined using both content and construct validity while reliability of the same questionnaire was determined using the Cronbach-Alpha Coefficient. Pilot testing of the questionnaire was done 1 week prior to the main study. Data obtained was analyzed using SPSS Version 21.0. The specific influence of independent variables against the dependent variable was tested through correlation and regression analysis. It was hoped that this study would generate imperative information, add to the available pool of knowledge and inform government policy and other key stakeholders. On access to credits, the study found that small-scale dairy farmers rely a lot in access to financial services, in order to boost the operations in the farms for buying feeds, milking machines and to expand in other areas of dairy practice. On access to markets, the study established that access to markets through opening new markets for milk and milk products, existing markets that increase markets share, assuring farmers of markets to their products highly contribute and promote dairy farmers to largely concentrate and practice dairy farming. The study also found that access skills and knowledge gained from the extension services and entrepreneurial behavior leads to growth of small scale dairy farming in Githunguri. From the regression analysis the following regression equation was formulated; $Y = 0.738 + 0.65X_1 + 0.556X_2 + 0.422X_3 + 0.516X_4$. The regression analysis showed that access to credit contributes most to growth of small-scale dairy farming in Githunguri, followed by access to market, entrepreneurial skills and extension services.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Kenya has a total area of 582,646 km², of which 11,230 km² is under water (CBS 1999), and a human population of 40.7 million (CBS 2009). Its climate varies from warm and humid in the coastal areas to cool temperate in the highlands. The annual rainfall ranges from less than 200 to over 2000 mm in some parts of the highlands. Its land productivity potential also varies from high potential, constituting less than 20% of the total land area, to very low potential in dry areas in the north-eastern parts of the country. Agriculture forms the backbone of Kenya's economy, contributing over 25% of the gross domestic product (GDP); about 80% of the country's poor depend on it for their livelihood and contributes 70% of the national employment. Dairy production systems in Kenya can largely be classified as large- or small-scale. Small-scale producers dominate dairy production, owning over 80% of the 3 million dairy cattle, producing 56% of the total milk production and contributing 80% of the marketed milk (Peeler and Omore, 1997).

Dairy is the second largest contributor to livestock GDP after beef. It provides income to more than 660,000 rural households, most of who have per capita income of less than US\$ 2 per day. Livestock contributes about 47% of the agricultural GDP and about 12% to the national GDP (FAO, 2005). The industry is characterized by smallholder producers, who produce over 70% of the total milk marketed in the country (Staal 2004a). Githunguri constituency holds a significant number of small scale dairy farmers and is one of the regions where milk production is growing.

In a previous study by (Staal, Kruska, Balteweck, Kenyanjui, Wokabi, Njubi, Thornton and Thorpe 1999), covering the majority of the milk producing regions in the country, most of those surveyed were smallholders and 73% of these had dairy cattle. These findings confirmed the significance of dairy in Kenya's agricultural sector and the country's economy. The study also established that dairy production is conducted on small farms with crossbred cow herds, which range in size from one to three head, and that production is based on close integration of livestock and crops. Dairy farms, milk processing plants and dairy related industries like animal feeds, agro-vets and dairy equipments stores offers employment opportunities to many Kenyans. This unique smallholder dairy system in Kenya is the most developed in sub-Saharan Africa with an estimated dairy herd of 3 million head.

Dairy marketing in Kenya is mainly of liquid milk where over 80% is sold raw with the participation of itinerant milk traders who control about 28% of marketed milk (Staal et al. 1999), despite a policy that discourages them. A well fed cow can produce as much as 40 litres of milk a day, while a cow without appropriate dry food risks producing as little as 8-10 litres – only 25% of the 'targeted' production. Dairy is important in the livelihoods of many farm households in rural Kenya and in terms of generating incomes and employment, including off-farm employment. As indicated, dairy production in Kenya is predominantly run by smallholders. Nevertheless, market-oriented dairy farming in Kenya, based on exotic cattle, started almost a century ago when European settlers introduced dairy cattle breeds and other exotic forms of agriculture from their

native countries. Several factors, which include the presence of significant dairy cattle populations, the importance of milk in the diets of most Kenyan communities, a suitable climate for dairy cattle and appropriate policy and institutional environment, have been contributing factors to the success of dairy production by smallholders (Conelly 1998; Thorpe, Muriuki, Omore, Owango and Staal, 2000). The success is also attributable to the fact that milk serves as a cash crop providing a continuous stream of cash throughout the year for households growing other cash crops whose income is realized only once or twice a year.

Currently small scale dairy farming is of major concern, development of smallholder dairy production systems in the Kenya highlands has been marked by declining farm size, upgrading to dairy breeds and an increasing reliance on purchased feeds, both concentrates and forage (Staal, Delgado and Nicholson, 1997). In regions such as Kiambu District, purchased fodder has become very important in dairying. The area planted with fodder for sale is equal to the area planted with maize, the staple food crop. In the past, taking up of dairy farming in Kenya has been driven by several factors including the presence of smallholder communities who kept cattle and who included milk as an important part of their diets; the presence of a significant dairy cattle population; a subtropical geography suitable for dairy cattle farming; and a conducive policy and institutional environment provided by successive governments. (Thorpe et al. 2000). Such combination of factors has led to a exceptional smallholder dairy industry in Kenya. Furthermore, opportunities for smallholder dairy production in Kenya are enhanced by the actuality that the country has the genetic base and holds 85% of the dairy

cattle population of eastern Africa (Thorpe et al. 2000); a well-developed milk processing sector putting it ahead of its neighbours; and the re-launching of the East African Community that has resulted in formation of a common market for a combined population of about 81 million people.

The presence of a large population of dairy cattle, a large and growing human population who include milk as part of their diets and a supportive environment are indications of the opportunities that exist for smallholder dairying in Kenya. Investment in the national rural infrastructure such as rural access roads, water supply and electricity and economic improvement in the country will allow for increased milk supply and consumption, and will contribute to increased employment. The contribution of dairying to the sustainability of smallholder crop–dairy systems through its roles in nutrient cycling, regular cash generation ability, employment creation and provision of farm household nutrition makes it an easy choice as a vehicle to address rural poverty.

1.2 Statement of the Problem

Most sub-Saharan Africa countries rely greatly on domestic production to meet their food needs. Investment in improved agricultural technologies holds the potential of unlocking the unique role of agriculture to drive pro-poor growth and economic development (Haggblade, Hammer, & Hazell, 1991; Johnston & Mellor, 1961). Until recently, policy makers have largely neglected the agricultural sector. This lack of investment and other factors have contributed to persistently low crop yields and limited use of improved technologies. For example, in contrast with its large arable land endowments, SSA currently accounts for less than 3% of global fertilizer use (FAO, 2008). Most people

cannot access sustainable financial services like savings, credit or insurance (Annan, 2003). Credit access is limited in most rural areas in developing countries such is a case of Githunguri farmers, because of high transaction costs, low level of economic activities, high level of production cost and price risks in agriculture and poor policies in credit write-offs. (Nair, 2007). Limited access to credit or insurance can also be a significant constraint with the high risks and high stakes in food production.

In spite of growing demand for agricultural products and some improved market conditions, smallholder farmers may be excluded from opportunities for a number of reasons. Relatively low population densities and poor infrastructure in and across many SSA countries isolate smallholder farmers from markets and increase transaction costs for input and output markets, especially for those within land-locked countries (Sachs & Warner, 1997). Livestock farmers are expected to pick new ideas and development messages to apply in their dairy practice. The production practices of Githunguri small scale dairy farmers show no or little evidence of innovations, the smallholder farmers continue to use old techniques leading to low production. This means poor returns, this explains that such farmers are not getting adequate and relevant extension information or the information is not packaged appropriately. Such information helps farmers to adopt and make sound management decisions on dairy production.

The dynamic connections of these and other exclusionary mechanisms with smallholder behaviors are likely influential in both causing and sustaining low-level production equilibriums and persistent poverty. Often referred to as poverty traps, these can be defined as ‘any self-reinforcing mechanism which causes poverty to persist’ (Azariadis & Stachurski, 2004). Selecting appropriate policies to spur on rural economic growth or

reduce poverty hinges on correct identification of the structural causes that underpin these poverty traps, where they exist. While a fast-growing literature has sought to empirically identify their existence in different settings, more research is needed to better understand the underlying mechanisms and their dynamic interactions with farmer behaviors and the broader food systems (Barrett & Carter, 2013).

1.3 Purpose of the Study

The purpose of this study was to examine the factors that influence the growth of small-scale dairy farming practice in Githunguri constituency.

1.4 Objectives of the Study

This study was guided by the following objectives:

- i. To establish the influence of access to credit facilities on the growth of small-scale dairy farming in Githunguri Constituency, Kiambu County.
- ii. To examine the influence of access to market on the growth of small-scale of dairy farming in Githunguri Constituency, Kiambu County.
- iii. To assess the influence of extension services on the growth of small-scale dairy farming in Githunguri Constituency, Kiambu County.
- iv. To establish the influence of farmers entrepreneurial skills on the growth of small-scale dairy farming in Githunguri constituency, Kiambu county.

1.5 Research Questions

- i. How does access to credit influence the growth of small scale dairy farming in Githunguri Constituency, Kiambu County?
- ii. To what extent does access to market influence the growth of small scale dairy farming in Githunguri Constituency, Kiambu County?

- iii. How do extension services influence growth of small scale dairy farming in Githunguri Constituency, Kiambu County?
- iv. To what level does farmers' entrepreneurial skill influence the growth of small scale dairy farming in Githunguri Constituency, Kiambu County?

1.6 Significance of the Study

It was hoped that this study would be of essential contribution to the practice, research and theory of farm management and to the body of knowledge of professional project planning discipline. The study aimed at providing development practitioners, consultants, farmers and the academia with vital information and an understanding of the milk production so as to help in creating a conducive institutional environment for the growth of the dairy industry, given the role the dairy industry play in national development.

Finally, it is expected that this study would make intuitive contribution to university teaching and lecturing in the field of livelihood support as well as animal husbandry management. In addition, new knowledge to be generated through this study will benefit program implementation agencies within the international and local development arena to refine their livelihood support techniques.

1.7 Delimitations of the Study

This study was delimited to the boundaries of Githunguri constituency and involved small scale dairy farmers who largely dominate in the area and those who sell their surplus milk were sampled for the study and local extension officers. The emphasis of the study was on credit access, access to market, extension services and farmers entrepreneurial skills.

1.8 Limitations of the Study

The study faced a number of limitations such as some dairy farmers were busy. To overcome this challenge during data gathering process, the study employed drop and pick later method of the questionnaires. The process allowed farmers to complete the questionnaires during their own free time.

1.9 Assumptions of the Study

The following were the assumptions of the study: factors like demographic characteristics, breed of cattle, nutrition of the animals among others were assumed to be constant and only access to credit, access to market, extension services and entrepreneurial skills of farmers in dairy farming were considered to be the only factors that influence growth of small scale dairy farming in the study area. The study also assumed that all responses received from respondents were true, transparent and they answered the questions precisely and honestly.

1.10 Definitions of Significant Terms Used in the Study

Awareness: Having knowledge on dairy farming in order to enhance growth in dairy industry.

Credit Access: Ability of individuals or enterprises to obtain financial services including credit, deposit, payment, insurance and other risk management services.

Dairy Farming:	A multi-purpose cattle system providing milk, manure and a capital asset to the farmer.
Extension Services:	A common feature of the administrative structure of rural areas with responsibility, in partnership with the farmers of directing programmes and projects for change.
Government Policy:	A plan or course of action adopted by a government intended to influence and determine actions and other matters.
Market Access:	Openness of a country's markets to foreign goods and services. Market access reflects the government's economic policies regarding import substitution and free competition.
Small Scale Farming:	A farming system that involves low production costs and resilient to market fluctuations/shocks, which gives them a unique opportunity to serve as a competitive source of milk supply.

Smallholder Dairy Farmer: A farmer keeping dairy cows with a herd of less than five cattle, therefore farmers with a herd of less than five cattle irrespective of the breeds will be considered to be smallholder farmers.

1.11 Organization of the Study

The study was organized in five chapters. Chapter one discussed the background to the study in which the contextual and conceptual issues were highlighted, the chapter brings out the study variables and highlights conceptual analysis and gave direction for the study. The chapter also covered the study problem, objectives of the study and research questions related to the study topic, and assumptions of the study, limitations, delimitations and definitions of significant terms. Chapter two covered the empirical and theoretical literature on study variables. The review gave a further elaboration on the context of the study. The chapter summarized studies that were assessed and provided a foundation upon which the findings were discussed. The chapter also gives the setting and the theory upon which this study was anchored. Pertinent gaps in empirical studies were identified to inform the conceptual framework where interrelationships between study variables are depicted on the conceptual model. A summary of knowledge gaps obtained from the empirical literature was also shown.

Chapter three covered research methodology as applied in this study, the research design, target population, sampling procedure, description of research instruments, pilot testing, validity and reliability of research instruments, methods of data collection, procedures for data analysis, operational definition of variables and ethical considerations. Chapter Four entails data analysis, presentation, interpretation and discussion of study findings while

chapter five covered summary of research findings, conclusions, recommendations and suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter contains an empirical review of relevant literature of the study. This review helped in anchoring the study on the theoretical framework and identified gaps in the empirical studies from which the conceptual framework was formulated.

2.2 Empirical Review on Dairy Farming

Milk production levels are clear indicators of growth of dairy farming, according to (FAO Report, 2014) world cow's milk production in 2012 stood at 620 million tones. The USA is the largest cow's milk producer in the world accounting for 14.6% of world production, producing nearly 91 million tonnes in 2012, an increase of 2.1% when compared to 2011. India is the second largest cow's milk producer, accounting for 8.7% of world production and producing 54 million tonnes in 2012. The UK is the 10th largest producer in the world producing nearly 14 million tonnes in 2012 and accounting for 2.2% of world cow's milk production. Of the top ten largest milk producing countries, New Zealand and Turkey have shown the largest percentage growth from 2011 to 2012 at 12.1% and 15.8%, respectively. In Kenya the dairy industry contributes to 14% of agricultural GDP and currently grows at 5% per year. With 1.5 million smallholder farmers producing milk, dairy has the prospective to greatly contribute to improving the food security and resilience of rural farming families in Kenya. Unfortunately, smallholder farmers often face serious constraints to scaling up production.

2.3 Access to Credit and Growth of small-scale Dairy Farming

Dairy farming entails long cycles of production which require up-front investment in animals, equipment, seeds, fertilizers, and other inputs. However, small farmers may have problems securing access to credit if they are located in remote areas that are not served by traditional financial institutions. World leaders meeting at the 2005 world summit at the United Nations recognized the need for access to financial services, in particular for the poor, including through microfinance and microcredit (UN, 2005). Many small farmers operate their businesses informally and frequently do not have records or financial information that banks require for lending. Some microfinance institutions have tried to expand their usual urban activities to rural clients, but the costs of doing business in rural areas are still high and limit their scope.

In Kenya, land ownership is poorly documented, so more often farmers cannot use their land as collateral to secure loans. Banks are hesitant to lend money to rural farmers and small business owners who have limited assets and virtually no financial history. This lack of access to commercial finance prevents many farmers and entrepreneurs from growing their businesses. (Burgess and Pande, 2004) studied the effects of bank expansion into rural India following government reforms which encouraged the move. Bank expansion into rural areas was followed by a reduction in rural poverty, which was also linked to an increase in savings mobilization. The study found that the increased number of bank branches allowed households to accumulate more capital and have access to longer term investment loans than previously possible. Bank branch openings thus helped increase total per capita output, especially for small scale manufacturing and services.

It is estimated that some 12-14 percent of the world population, or 750 to 900 million people, live on dairy farms or within dairy farming households. According to a recent report (Chen and Ravallion, 2008), in 2005 about 2.6 billion people in the developing world (48 percent of the total population) were surviving on less than US\$2 per day and about 149 million farm households, mostly smallholders, kept livestock for the purpose of producing milk for self-consumption or sale. Given the increasing 'interconnectedness' of global agriculture, the ability of smallholder milk producers to participate in the dairy market in a profitable manner depends not only on their own competitiveness, mainly determined by their production costs, but also on the efficiency of the dairy chains to which they belong. Therefore, recommendations for smallholder dairy development must perforce include strategies to develop and increase competitiveness in all segments of the dairy chain, namely, input supply, milk production, processing, distribution and retailing. (Ghosh, Mookherjee & Ray, 1999) argue that credit is essential in allowing capital investments among producers (such as farmers) who are not able to save, as well as giving households the ability to obtain money in an emergency. The availability of credit also increases risk taking with the adoption of new technologies or productivity enhancing investments for poorer households or producers, hence contributing to increases in production and income. Access to household credit can have a positive impact on growth through its impact on human capital accumulation, and that this is affected by the initial distribution of wealth; richer families are better able to invest in human capital accumulation leading to increased growth (Galor & Zeira, 1993).

Low capital reserves and limited access to credit often leads to the household absorbing the dairy income to cover its basic needs, leaving the farm with little or no capital to reinvest in the dairy enterprise or other profitable activities. According to (Eswaran and Kotwal, 1990) argue that having access to credit may reduce household vulnerability to negative shocks by increasing their ability to smooth consumption during difficult times, and that availability of credit also allows households to undertake riskier investments as it will enable them to better deal with the consequences of poorly performing investments. In addition, (Deaton,1991) argues that by reducing the financial risks faced by households in this way, access to financial services may decrease the proportion of low-risk, low-return assets held by households for precautionary purposes (such as jewellery), and enable them to invest in potentially higher risk but higher return assets, (such as education or a rickshaw), with overall long-term income enhancing impacts.

De Gregorio (1996) also argues that access to credit promotes human capital accumulation, as credit constraints will force students to work, which will reduce the time available for study. Dehejia & Gatti (2002), Beegle, Dehejia & Gatti (2003), and Jacoby (1994) also find that access to risk-reducing financial services increases investment in schooling. Access to credit can help livestock farmers boost production and employ better methods of livestock farming. It is estimated that 36% of rural Kenyans have no access to any form of financial services. Access to financial services is one of the obstacles that many farmers have to overcome to be able to engage in commercial livestock production. High risks connected to drought, floods and the inability of small scale farmers to provide collateral for their loans have resulted in farmers getting the

lowest levels of credit compared to other sectors in the economy. However farmers can overcome these hurdles. Farmers need to consider livestock farming as a viable business rather than a daily occupation because a well-organized farming business can easily attract funding. There is need to provide good records and provide a clear growth path and demonstrate that the business can make profits.

2.4 Access to Market and Growth of small-scale Dairy Farming

Infrastructure such as rural access roads, and water and rural electricity supplies have a major influence on milk marketing efficiency and are perhaps the most limiting factors to the development of the smallholder dairy. (Amrouk, 2013) look at access to markets for smallholder farmers without separating their definition from market participation, to which they believe, implies the transition from subsistence farming to a market engagement mode, with frequent use of markets for the exchange of products and services. In this context markets refer to both input markets where factors of production are exchanged, and the output markets where the exchange of agricultural produce takes place.

Markets play a crucial role in agriculture in that the livelihoods of the majority of the world's poor people depend on participating in markets either as workers or producers, with many successes in poverty reduction historically being associated with the growth of "markets and private economy" (FAO, 2009:4). Markets are so pivotal in that their functioning determines the "pattern of growth and consequently the speed and extent of poverty reduction" (DFID, 2005:5). Markets somehow do not always work for poor people, especially those in rural areas for whom the cost and risk of participating in markets is too high (Kapungu, 2013:37). The populations in most developing countries

are located in rural areas, with a high dependence on subsistence farming, this entails that the food they produce is for consumption and only the surplus is what they would consider for sale to the market, agriculture production is not solely embarked on for commercial purposes. According to Barret (2010:41) market access for smallholders is not just about being able to buy and sell goods; it is as much an outcome as it is the cause of development.

Amrouk et.al. (2013) identified that this transition from subsistence to smallholder market participation is influenced by three key components, these are summarized as; the initial conditions related to both farm and farmer characteristics, the prevailing physical and institutional infrastructure and the macro and sectorial policies through their impact on price and trade incentives. In order to benefit from market access the farmer has the option of remaining at subsistence level or the farmer may choose to specialize in a particular enterprise thus generating the relevant skill and the surplus being sold to the market (Barret, 2010). Milk production in Kenya is based on several different species of livestock but for marketed milk, the most important species is cattle. It is estimated that of the 2.4 million tonnes of milk produced annually from all species, cattle produce about 2 million tonnes, of which 1.6 million tonnes is from the dairy herd and mainly from the smallholders. On-farm consumption (non-marketed milk) accounts for about 40% of milk and the remaining 60% is marketed through various channels. Less than 15% of marketed milk flows through milk processors (Thorpe et al. 2000), who include Brookside, Spin Knit, Premier, KCC and other smaller private processors. The balance of marketed milk is sold as raw milk. Non-processed milk marketing channels include: direct milk sales to consumers by farm households (58%); and milk collected by dairy co-operative societies,

self-help groups and individual milk traders who also sell either directly to consumers or to processors.

Differences in milk marketing channels exist between and within the country's various regions. Until recently, marketing through KCC dominated in areas with high production and low consumer concentration or few alternative market outlets. Nairobi city and its environs, which is the largest single market in the country, accounts for over 60% of the formally marketed milk whilst Coast Province and parts of Western Province are among the milk deficit areas in the country.

Dairy farming is a big business in Kenya, but small cooperatives need support to make it pay in a competitive market. Competing with large companies means competing against their access to better strategy advisors, closer political links and greater influence over market pricing. Many dairy farmers have at least two options for selling the milk they produce. One option is 'hawking' (selling milk to local regulars or passers-by), which offers high sales prices of as much as Kshs 50-60 per litre. However, demand is relatively low and involves risks for the consumer, since the milk is unpasteurized. The more stable option is joining a cooperative, which offers a set demand and supply model with a price of KeS 35 per litre. The cooperatives also guarantee the quality of milk, as it is tested upon purchase and processed industrially before being resold.

The choice of stability over irregular profitability explains the proliferation of cooperatives over the last 50 years in Kenya. The country has close to 13,000 established units today, facilitating market access for more than 1.5m dairy farmers. Dairy cooperatives assist farmers in issues such as loans, artificial insemination and livestock

rationing, with direct implications for milk production. Smallholder dairying dominates both milk production and marketing in Kenya. The history of the dairy industry in Kenya spans almost a century, but not until the 1960s did the smallholder get into commercial dairy production. Dairying is a source of income not only to the estimated 625 thousand smallholder households, but also to a larger number of individuals employed in milk marketing. Moreover, it plays a crucial role in sustaining smallholder crop–dairy systems through nutrient cycling within the system. The current milk production level of 4–5 litres/cow per day can be improved. This will, however, only occur if there is investment in market infrastructure and a general improvement in the economy.

2.5 Extension Services and Growth of small-scale Dairy Farming

National agricultural extension services are designed for transmitting information on crops, while Livestock ministries are dominated by vets who are mainly concerned on animal health (Morton and Matthewman, 1996). Extension information services are essential for boosting agricultural activities in the world over. It involves getting new innovations off the shelf to the fields/farms where they are put into use. Generally, it encompasses a lot of processes and activities that are geared towards helping the farmer gain knowledge which in the long run leads to sustainable increased productivity. The information on the new and existing livestock policies are disseminated through the extension service.

Extension is therefore a critical change agent for livestock production. It is also useful in transforming subsistence livestock farming to modern and commercial livestock activity. This is an important ingredient in promoting household food security, improving incomes and poverty reduction (Lukuyu, 2007). Extension services bring scientific knowledge to

farmers so that they improve efficiency in their activities (KARI, 1999). Lack of knowledge and technical know-how therefore largely affects smallholders capability to manage their farms as 'enterprises' also Poor access to support services; farmers in developed countries have access to support services ranging from production and marketing advice to support in family issues, which enables them to focus on what they do best and to buy-in the knowledge and skills they lack. Such services are usually lacking in developing countries or are difficult for small-scale farmers to gain access to. For instance cattle breeding in the smallholder sector depend on the availability and cost of artificial insemination (AI) services and/or bull service.

Use of AI was very popular when it was provided almost free-of-charge by the government but use of bulls has been increasing since the collapse of the government AI services, following their liberalization. Improved dairy cattle production by indigenous Kenyans was not carried out until after 1954 when the Swynnerton Plan of 1954 allowed them to engage in commercial agriculture (Conelly 1998). By 1963, when Kenya attained independence, the dairy herd had expanded to about 400 thousand exotic cattle largely in the hands of the settlers. After independence, there was a rapid transfer of dairy cattle from the settler farms to the smallholders resulting in a decline in the cattle population on large-scale farms to 250 thousand head by 1965. To encourage dairy production by smallholders, the government affected a number of changes in the provision of livestock production and marketing services, resulting in highly subsidized services. In 1971, the government abolished the contract and quota system of dairy marketing to Kenya Co-operative Creameries (KCC) to allow for the inclusion of smallholder producers.

The continued provision of highly subsidized livestock and other services by the government proved unsustainable due to budgetary and other constraints. By the late 1980s, the quality of livestock services provided by the government had declined, prompting it to adopt structural adjustment and economic restructuring which, among other changes, included liberalization of the dairy industry with a view to increasing the role of the private sector (Omore et al. 1999). In the period preceding the 1980s, parastatal and other quasi-government institutions such as KCC and Kenya Farmers Association played major roles in marketing and delivery of agricultural commodities, services and inputs. With their collapse, there is increased reliance on the private sector, including community-based organizations (CBOs), for delivery of livestock and other agricultural services formerly in the government domain.

The government unveiled the National Agricultural Extension Policy (NAEP) in 2001 to provide policy guidelines in the provision of extension services. The policy spells out the procedures to be applied in providing extension service and setting out benchmarks in extension service delivery. Implementation of NAEP was not well coordinated necessitating the government to revise it in 2005 to bring on board other perspectives and new ideas. The new extension policy, the Revised National Agricultural Sector Extension Policy (NASEP), addresses key issues on extension service delivery such as packaging of technologies, technical capacity building and research-extension-farmer linkages. It advocates for an extension service that is well coordinated, decentralized, and the use of multi-sectoral approaches that respond to user-demands.

The policy emphasizes development of content and choice of extension messages to be done appropriately (NASEP, 2007). These extension policies have led to growth in the

agricultural sector which includes the livestock sub-sector. The dairy industry has been boosted, making the smallholder dairy production account for more than 70 percent of the milk production and supports more than 600,000 smallholder dairy farmers.

In recent years there has been increased reliance on the private sector, including CBOs, to provide AI and other livestock services in place of the collapsed government services; however, as yet they have not been able to fill the gap as supported by Staal (1998). Either because of this or other circumstances, calving intervals are long, with an official national estimate of 450 days and recent studies indicating an average of 590 days in Kiambu. There have been deliberations, at the policy level, on how the change from a government controlled to a liberalized economy, including dairy subsector, should have been managed to avoid disruptions of service provision to the farmers. Nevertheless, no ‘concrete’ plans have been put in place to address the issues discussed. An effective extension information service is one that meets the farmers’ needs and the content of the information is specific, simple, and useful (Gundu, 1985). The information should also be relevant, complete and comprehensive.

2.6 Entrepreneurial Skills and Growth of small-scale Dairy Farming

Small scale farmers all over the world have shown an outstanding ability to adapt. They look for better and enhanced ways to organize their farms. They undertake new crops, better animals and alternative technologies to increase productivity, diversify production and reduce risk. Farmers themselves are supposed to demonstrate a proactive approach and initiative, engaging in innovative and dynamic business activity. Entrepreneurship is considered to be a crucial dynamic force and relevant in the development of small business in general because the farmer needs to find ways to adapt their businesses to the

changing situation. The importance of entrepreneurship may also be associated with the idea that the ongoing changes bring with them new opportunities for farm business and, do not simply narrow down or extinguish previous operational preconditions (Bryant 1989).

Entrepreneurial skills describe an individual as well as to the activity, it describes the individual who knows how to do something in business as well as the tasks and activities that the individual needs to know how to do in the business context.

Farmers are assumed to have been detached from the market logic, and for this reason they have been identified as peasants rather than entrepreneurs (Ploeg 2003). In agricultural and rural sociology, entrepreneurship has normally been associated with risk taking and profit maximizing orientation. Farmer-entrepreneurs see their farms as a business. They see their farms as a means of earning profits. They are passionate about their farm business and are willing to take calculated risks to make their farms profitable and their businesses grow. (Salamon, 1992).

Entrepreneurial farmers energetically devise strategies, driven to expand, innovate, increase profits or improve the family social standing. Some small-scale farmers do have these qualities, but they still focus on maintaining their traditional way of life. Their production decisions are based on what they need not on what is possible. The farmer-entrepreneur produces a clear picture in his mind of what is possible and the future he wants, he knows that what is possible is determined by the market. The farmer-entrepreneur is always looking for new opportunities. He knows that new opportunities are found in the market. The farmer entrepreneur wants to make profits and knows that

profits are made in the market. Similarly, (Ploeg, 2003) connects entrepreneurship to the profit maximization and the scale enlargement, which according to him has been a key trend in the structural development of Dutch agriculture in the last decades.

A study by (Kodithuwakku and Rosa, 2002) found that there were clear differences in the economic successes among the farmers; the results indicated successful farmers were better able to organize resources through social networks and they were pursuing multiple opportunities. Therefore thriving farmer-entrepreneurs are technically competent, innovative and plan ahead so they can push their farm businesses through the stages of enterprise development from establishment and survival to rapid growth and development. Nonetheless, there are many challenges that farmers face such as social barriers, economic barriers, regulations, access to finance and information, and their own managerial capacity to cope with risks and changes and to take hold of opportunities.

2.7 Theoretical Framework

The theory explored for this study was Wilson's theory of information needs. Since the study sought to assess the effectiveness of information and needs of small scale dairy farming and how access to adequate and comprehensive information on services that influence their ability to develop and enhance dairy production industry.

2.7.1 Wilson's Theory of Information Needs

Wilson's 1981 model of information-seeking behaviour explain the general information seeking. Information may be understood in several contexts such as in information exchange where an individual may be looking for facts, advice or opinions and may receive any of these either in writing or orally.

Wilson (1997), states that information behavior can be defined by use of the general model of information behavior, information behaviour needs to include; An information need and its drivers, factors that give rise to an individual's perception of need, the factors that affect the individual's response to the perception of need and the process or actions involved in that response.

The theory was central to the study as it focused on the provision of livestock extension information services to farmers. The aim was to find out the range of information services offered to the farmers by extension workers and other key informants and the extent to which the information improves dairy production practices. It involves establishing the nature of services offered, how they are disseminated and how applicable they are to growth of dairy farming industry. In this theory the user of information may be found in communication or information contexts. In this case the user is a communicator as well as an information seeker. Wilson (1981) advocates for the dropping of the word information needs and to think instead of "information-seeking towards the satisfaction of needs". Thus, smallholder dairy farmers seek information that would help them improve their production.

In the 1999 model, Wilson noted that information-search behaviour is a subset of information-seeking behavior which in turn is only a subset of all possible information behaviour. Therefore an individual experiences an information need, then goes out to seek that information and uses it to deal with the problem. The setback to this model is that getting the required information may not be that simple. Sometimes, the user of the information is not aware of the need for it. In regular circumstances, the information-seeking behavior may take several forms. The consumer may seek it in libraries, on-line

services, and information centers which generate vital information in addition to their primary functions like agricultural extension services and credit facilities.

2.8 Conceptual Framework

The figure illustrates the nexus of interrelationship between the study variables

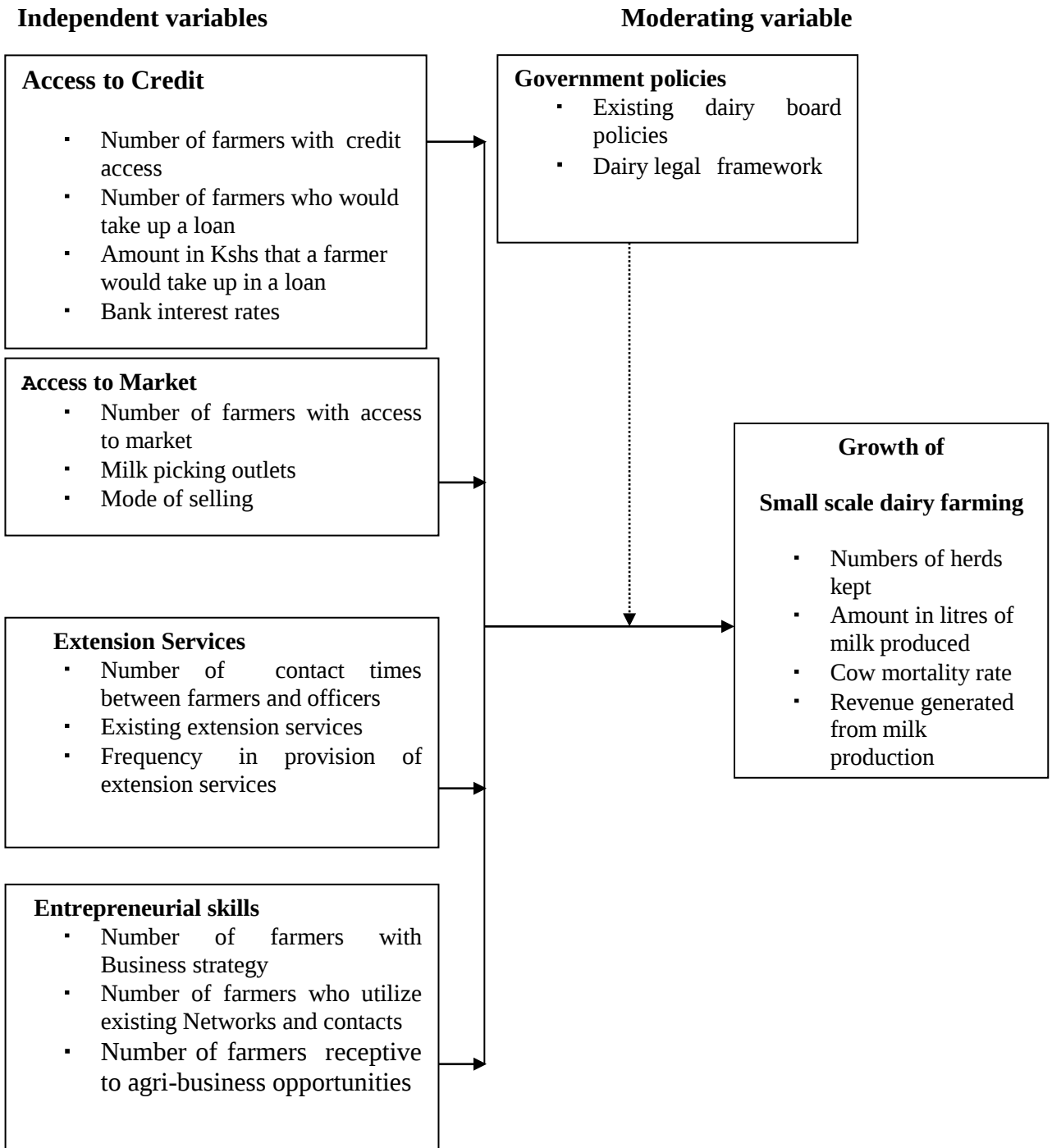


Figure 2.1: Conceptual Framework

2.9 Research Gaps

Table 2.1 Research Gaps

Variable	Author and Year	Findings	Knowledge gap
Access to credit and growth of small-scale dairy farming	UN, (2005) Ghosh,(1999) De Gregorio,(1996) Galor , (1993) Deaton, (1991) Eswaran, (1990)	Found that having access to credit reduce household vulnerability to negative shocks by increasing their ability to undertake riskier and better investments	There is need to explore this findings in the context of small scale dairy farmers and how such ability influence small scale dairy farming
Access to Market infrastructure and growth of small-scale dairy farming	Armouk (2013) Barret (2010) FAO (2009) DFID (2005)	Noted poverty reduction is associated with the growth of “markets and private economy”. They believe markets are so pivotal in that their functioning determines the “pattern of growth and consequently the speed and extent of poverty reduction”	This study shall seek to center more on access to market and strategically bring out its influence on small-scale dairy farming.
Extension services and growth of small-scale dairy farming	Lukuyu,(2007) NASEP, (2007) KARI(1999) Morton (1996)	Extension services have been sited to bring scientific knowledge to farmers so that they improve efficiency in their activities.	There is a need to put emphasis on and examine the evidence of influence of extension services on growth of small-scale dairy farming.
Entrepreneurial skills and growth of small scale dairy farming	Ploeg (2003) Kodithuwakku (2002) Salamon (1992)	Entrepreneurial skills have been cited to enhance profit maximization, risk management and ability to utilize opportunities	The study therefore sought to elaborate how this influences overall growth in dairy farming industry.

2.10 Summary of Literature Review

Reviewed literature was undertaken in detail focusing on small scale dairy farming. The literature covered empirical and theoretical literature on study variables. The review in this chapter gave a further elaboration on the context of the study. The chapter also summarized studies that were assessed and provided a foundation upon which the findings were discussed.

The chapter also gave the setting and the theory upon which the study was anchored. Pertinent gaps in empirical studies were identified to inform the conceptual framework where interrelationships between study variables were depicted on the conceptual model. A summary of knowledge gaps obtained from the empirical literature was also shown.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methods that were used to provide answers to the research questions. It focused on research design, target population, sampling procedure, data collection methods, validity, reliability, methods of data analysis, operational definition of variables and ethical issues.

3.2 Research Design

The study used ex-post-facto descriptive survey design to determine how and to what extent the four mentioned factors influence the growth of small scale dairy farming. This design sought to describe specific characteristics of a group; it was applied because of its ability to ensure minimization of bias and maximization of the reliability of evidence to be collected.

This design was also ideal for the empirical inquiry in this research since the researcher did not have direct control over the independent variables because their manifestations already existed; hence they were inherently not manipulatable. The study also involved collection of quantitative data for purpose of the research questions.

3.3 Target Population

Mugenda and Mugenda (2003) explain that the target population refers to the population to which a researcher wants to study. The area of the study has 145 active members according to the Ministry of Industrialization and Enterprise Development Kiambu and Thika branch, 2015, comprising of 135 farmers and 10 Extension officers. The small

scale dairy farmers were categorized according to their electoral wards. This composition is as shown in Table 3.1.

Table 3.1 Target Population

Ward/Category	Number
Githiga	25
Komothai	25
Ikinu	30
Githunguri	30
Ngewa	25
Agricultural Officers	10
Total	145

3.4 Sample Size and Sampling Procedure

The study used a sampling frame to determine the size of the sample.

3.4.1 Sample Size

Sample size determination for respondents followed a procedure determined by Krejcie and Morgan (1970). As indicated in the Table 3.2, a population of 145 corresponds to a sample size of 103 respondents. Therefore 96 small-scale dairy farmers and 7 extension officers were sampled for this study.

Table 3.2 Sampling Frame

The sampling frame was determined using proportions as illustrated

Ward/Category	Number	Sample
Githiga	25	18
Komothai	25	18
Ikinu	30	21
Githunguri	30	21
Ngewa	25	18
Agricultural Officers	10	7
Total	145	103

3.4.2 Sampling Procedure

The sample indicated the total number of respondents to be selected from the target population. Sampling is done because it is not conceivable to obtain information from the whole population. The study determined the sample size using the Krejcie and Morgan original table for cross validation (see appendix V). As a result, from this table the sample size for 145 respondents is 103. This was important to the researcher since it was useful to bringing out reliable representation of the population this was deemed as an appropriate sample size for this study at 0.05 confidence.

3.5 Research Instruments

This study employed two sets of questionnaires for two different categories that included small-scale dairy farmers and extension officers as a primary tool for data collection. The questionnaires had both structured and unstructured questions with 6 sections, for dairy

farmers (See Appendix III) and 5 sections for Extension officers (See Appendix IV). The questions were systematic and pre-determined and were presented with exactly the same wording and in the same order to all respondents.

3.5.1 Pilot-testing of the Research Instrument

A pilot study on the questionnaire was conducted out one week prior to the main study. Pilot testing process entailed picking 10 respondents and administering the questionnaire to them. Pilot testing was useful to point out any problems with instructions, detect instances where items could have been not be clear and assist the researcher to format the questionnaire and remove any noted typographical errors and inconsistencies (Mugenda, 2003).

The primary purpose of pilot-testing of the research instrument was to construct an initial picture of test validity and reliability, help elicit appropriate responses to the study and determine if questions were relevant and appropriate. Corrections and modifications were therefore undertaken to correct any anomalies noted on the instrument before the actual study. The 10 respondents were not surveyed during the actual study.

3.5.2 Validity of the Research Instrument

Validity helps the researcher to be certain that questionnaire items measures the desired constructs. (Donald and Delno, 2006) define instrument's validity as the appropriateness, meaningfulness and usefulness of inferences a researcher makes based on data collected. (Mugenda, 2003) agrees with this assertion that validity has to do with how accurately the data obtained in the study represents the variables.

This study made use of content and construct validity. Content related validity method was thought to be ideal for this study since it was consistent with the objectives of the study. Construct validity was also useful through construction of new knowledge and approaches.

3.5.3 Reliability of the Research Instrument

Reliability is held to be achieved if an instrument yields consistent results with repeated trials of the same object. In this study the test-retest method was used (Coopers and Schindler, 2003). The test-retest criterion was applied since respondents in this study were well-read hence they understood the need for filling the questionnaire for the second time. To measure the reliability coefficient of the research instrument, Cronbach's Alpha reliability coefficient was determined for all the variables in the study which resulted to 0.735. Cronbach's alpha coefficient ranges between zero and one. Mugenda, and Mugenda, (1999) recommend a threshold level of 0.70 for an acceptable reliability Coefficient.

3.6 Data Collection Procedures

The study used primary data. The type of data to be collected was informed by the objectives of the study as supported by Teddlie (2010).

After successfully defending the proposal, the researcher sought to obtain a letter of introduction from the University of Nairobi and a research permit from National Commission for Science, Technology and Innovation. The study then enlisted all respondents. The entire data exercise took to about 2 Months. After which the data collected, was checked for errors and any inconsistencies.

3.7 Methods of Data Analysis

Data analysis is the process of systematically arranging field findings for presentation. Data collected was analysed using SPSS version 21 based on the themes of research objectives. The statistical test to determine the influence of an independent variable against the dependent variable was analysed through correlation and regression. Pearson's product Moment Correlation Coefficient (r) was applied.

3.8 Operationalization Definition of Variables.

Table 3.3: Operationalization Definition of Variables

Objectives	Variable	Indicators	Measurement Scale	Analysis Tool
	Independent Variables			
To establish the influence of access to credit facilities on growth of small-scale dairy farming in Githunguri Constituency, Kiambu County.	Access to Credit	i. Number of farmers who know about credit facilities ii. Number of farmers who would take up a loan iii. Amount in Kshs that a farmer would take iv. Bank interest's rates required to take up loan	Ordinal Ordinal Interval Ordinal	Mean Mode Median Frequency Anova Regression
To examine the influence of access to market on growth of small-scale of dairy farming in Githunguri Constituency, Kiambu County	Access to market	i. Milk picking outlets ii. Preferred immediate buyer iii. Mode of selling	Nominal Nominal Nominal	
To assess the influence of extension services on growth of small-scale dairy farming in Githunguri Constituency, Kiambu County.	Extension Services	i. Level of contact between farmers and officers ii. Existing extension services iii. Frequency in provision of extension services	Ordinal Nominal Ordinal	
To establish the influence of farmers entrepreneurial skills on growth of small-scale dairy farming in Githunguri constituency, Kiambu county.	Farmers entrepreneurial skills	i. Number of farmers with Business strategy ii. Number of farmers who utilize existing networks and contacts iii. Number of farmer receptive to agri-business.	Ordinal Ordinal Ordinal	
	Dependent Variable	i. Numbers of herds kept ii. Amount in litres of milk produced iii. Cow mortality rate iv. Revenue generated	Interval Interval Ordinal Ordinal	

3.9 Ethical Issues

Ethical considerations in this study were made on the basis of the basic concepts and aspects identified as important. The researcher wrote a letter of transmittal of data collection instruments and informed all respondents in the research process that the research was purely for academic purpose and provided adequate and clear explanation on the purpose of the study to each respondent. (See Appendix I). The study also sought respondent's permission to participate in the study while assuring them that their participation was voluntary.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATIONS AND INTERPRETATIONS

4.1 Introduction

This chapter provides an analysis of data collected from the field. The results are presented in tables to highlight the major findings. It presents preliminary results, reliability and validity test, questionnaire return rate, characteristics of the respondents and statistical analysis of factors influencing the growth of small-scale dairy farming which was presented sequentially according to the research questions of the study.

4.2 Preliminary Results

This section covers the preliminary results of the study. The result includes reliability test and validity test and response rate.

4.2.1: Reliability and Validity Test

A pilot study was conducted to find out if the respondents could answer the questions without difficulty. Respondents in the pretest were drawn from Limuru Area (equating to ten purposively selected respondents) perceived to be knowledgeable in growth of small-scale dairy farming in Githunguri Constituency. They were asked to evaluate the questions for importance, comprehension, meaning and precision. The instrument was modified on the basis of the pilot test before administering it to the main study respondents. Cronbach Alpha was therefore used to test reliability of the instrument. A coefficient of 0.7 and above shows high reliability of data (Saunders, 2009). The Cronbach Alpha test of the instrument resulted in a value of 0.735 which is greater than 0.7, thus the questionnaires were reliable.

4.2.2: Questionnaire Return Rate

Out of the 103 respondents, 91 of them participated in the study. This constitutes a response rate of 88.3 percent. Out of these questionnaires, 87 were considered usable for the study. This accounted for 84.4 percent of the respondents. The other 4 questionnaires had highly significant levels of missing information. The remaining cases represented an adequate response rate for the precision and confidence required in this study.

4.3 Characteristics of the Respondents

The study sought to establish the information on the respondents employed in the study with regards to the gender, age and academic background. The bio data points at the respondents' appropriateness in answering the questions.

4.3.1 Distribution of Respondents by Gender

Finding about respondent's gender was essential to this study. It was important to assess if one's gender determines who makes the decision in dairy production activities. Table 4.2 indicates gender distribution of respondents.

Table 4.1: Gender distribution of Farmers

Gender	Frequency	Percentage
Male	50	58
Female	37	42
Total	87	100

Source: Survey Data (2015)

The study findings in Table 4.1 show that a majority of the respondent 50 (58%) were male while 37 (42%) were female. The study findings show that the information collected

to establish the growth of small-scale dairy farming in Githunguri Constituency reflected perspectives from both gender.

4.3.2 Distribution of Respondents by Age

The study sought to establish the distribution of respondents by Age. The study was interested in establishing whether age had influence on the growth of small-scale dairy farming. In view of this respondents were asked to state their age bracket.

Table 4.2: Distribution of Age Group

Age Group	Frequency	Percent
40 and above	55	63.2
31- 40	26	29.9
20 -30	6	6.9
Total	87	100.0

Source: Survey Data (2015)

The results presented in Table 4.2 show that a small proportion of 6, (6.9%) are aged between 20 to 30 years, this was followed by 26, (29.9%) that had attained ages from 31 to 40 years, and 40 years and above were 55, (63.2%) respectively. The age composition shows that most of the respondents were of the 31 and above and therefore had rich experiences, could also appreciate the importance of the study, while those below the age of 30 were not conversant enough with growth of small-scale dairy farming in Githunguri Constituency probably due to lack of experience.

4.3.3 Distribution of Respondents by Highest Level of Education

Respondents were asked their highest level of education level attained. This was crucial as the level of education determines if information sharing can be done with no difficulty.

Table 4.3: Highest Level of Education of the Respondents

Level of education	Frequency	Percent
Master's Degree	9	10.3
Bachelor's Degree	22	25.3
Diploma	16	18.4
Certificate	40	46
Total	87	100

Source: Survey Data (2015)

From Table 4.3, 9, (10.3%) had master's degree; 22, (25.3%) of the respondents said they had undergraduate degree while another population of 16, (18.4 %) of the respondents had Diploma level of education. There was a substantial number of 40, (46%) who had acquired certificates from various fields. There were no respondents without basic education.

4.4 Growth of Small-Scale Dairy farming

The intention here was to show the growth of small scale dairy farming. The background of the respondents was obtained through questionnaires. Respondents characteristics considered were their purpose of doing dairy farming, income generated monthly, volume of milk produced per month and total herd size.

4.4.1 Main Reason of Keeping Dairy Cattle's

Table 4.4: Main Reason of Keeping Dairy Cattle's

Market Accessibility	Frequency	Percent	Mean	Std. Deviation
Hobby	19	21.8	3.0930	.31760
Income	42	65.4	3.3488	.38604
Family consumption	26	29.9	3.4186	.36306
Total	87	100		

Source: Survey Data (2015)

From Table 4.4, 19, (21.8%) of the respondents agreed that they keep dairy cattle's for hobby; 51 (65.4%) of the population agreed that that they keep dairy cattle's for income generation while another population of 26 (29.9%) of the respondents agreed that they keep for family consumption. This number is an indication that all cows are kept for milk production (income generating).

4.4.2 Number of dairy cattle

Table 4.5: Number of dairy cattle

Number of dairy cattle	Frequency	Percent	Mean	Std. Deviation
1-3	3	3.4	2.9302	.23269
4-6	22	25.3	3.0000	.28680
7-9	46	52.9	3.4419	.39589
10 and above	16	18.4	3.2558	.38961
Total	87	100		

Source: Survey Data (2015)

From Table 4.5, 3 (3.4%) of the respondents had an average of between 1 to 3 dairy cattle; 22 (25.3%) of the respondents had an average of 4 to 9 cattle; a substantial

population of 46 (52.9%) had an average of 7 to 9 Dairy cows another population of 16 (18.4%) of the respondents had an average number of 10 and above. In terms of herd size, on average the number of herd was 4 to 7. There was however, a significant difference in the herd size among different dairy farmers. This difference may also be a reflection of land size owned by an individual because it is very likely to keep more cows if a farmer has more land and vice versa. This difference in herd size could also be attributed to the size of land committed to non-dairy activities.

4.4.3 Total Litres of Milk Produced in a Day

Table 4.6: Total Litres of Milk

Total Litres of Milk	Frequency	Percent	Mean	Std. Deviation
1-5	1	1.1	2.9302	.23269
6-10	24	27.6	3.0000	.28680
11-15	46	52.9	3.4419	.39589
16 and above	16	18.4	3.2558	.38961
Total	87	100		

Source: Survey Data (2015)

From Table 4.6, only 1, (1.1%) respondent had an average of 1 to 5 litres of milk per day; 24 (27.6%) of the respondents produce between 6 to 10 liters of milk per day; a good number of respondents 46, (52.9%) produce between 11 to 15 liters of milk per day while another population of 16, (18.4%) respondents produce between 16 and above liters of milk per day.

4.4.4 Cow Mortality Rate

Table 4.7: Cow Mortality Rate

Cow Mortality Rate	Frequency	Percent	Mean	Std. Deviation
Very High	3	3.4	2.9302	.23269
High	17	19.5	3.0000	.28680
Low	54	62.1	3.4419	.39589
Very low	13	15	3.2558	.38961
Total	87	100		

Source: Survey Data (2015)

From Table 4.7, 3 (3.4%) of the respondents experience very high cow mortality rate; 17, (19.5%) were of the opinion that they experience high cow mortality rate; a substantial population of 54, (52.9%) pointed out that they experience low cow mortality rate while another population of 13, (15%) of the respondents experience very low cow mortality rate.

The study indicates that there have been persistent cow mortality rate. The single largest cause of cow death as reported by farmers was lameness or injury, followed by mastitis, calving problems, and unknown reasons. Besides being an economic issue, as replacing dead cow's costs money, high cow mortality is also an indication of an animal welfare problem. Crowded barns, high levels of concentrate feed, lack of dairy personnel training and lack of experience to identify early stages of disease and apply timely and appropriate treatment are all factors that contribute to the loss of animals on the farm.

4.4.5 Cause of cow mortality rate

Table 4.8: Cause of cow mortality rate

Cause of cow mortality rate	Frequency	Percent	Mean	Std. Deviation
Lameness or injury	1	1.1	2.9302	.23269
Mastitis	24	27.6	3.0000	.28680
Calving problems	46	52.9	3.4419	.39589
unknown reasons	16	18.4	3.2558	.38961
Total	87	100		

Source: Survey Data (2015)

From Table 4.8, 1, (1.1) respondent experienced a cow mortality caused by lameness or injury; 24, (27.6%) of the respondents experienced mastitis problems; 46 respondents, representing (52.9%) were of the opinion that they mortality problem was caused by calving problems while another population of 16, (18.4%) respondents did not understand they cause of cow deaths.

4.4.6 Monthly Household Earnings from Milk Production per Month

Table 4.9: Monthly Household Earnings

Monthly Earnings	Household	Frequency	Percent	Mean	Std. Deviation
5000-10000		1	1.1	2.9302	.23269
11000- 15000		24	27.6	3.0000	.28680
16000-20000		46	52.9	3.4419	.39589
Above 20000		16	18.4	3.2558	.38961
Total		87	100		

Source: Survey Data (2015)

From Table 4.9 indicates 1, (1.1%) respondent had an average of 5000 to 10000 monthly earnings; 24, (27.6%) of the respondents earn between 11000 to 15000 KShs per month; another population of 46, (52.9%) respondents earn between 16000 to 20000 while another population of 16, (18.4%) respondents earn above 20000 KShs per month.

Research results indicated that on average, the total amount of milk earnings from produced per month was 16,475 KShs. It further indicated the significant difference in the amount of earning from milk production per cow by an individual vary between 21, 000 and 14, 750 KShs per month. This difference may be attributed to not only the size of herd but also the practice of modern dairy farming system as well as the channel of marketing. This may be a convincing argument based on the fact that, modern dairy farming system in which farmers keep breeds like Friesian and Jersey could lead to production of more liters per cow compared to the traditional dairy farming system in which local cattle are kept and produce very fewer litres of milk per cow.

4.5 Access to Credit and its influence on Growth of Small-scale Dairy Farming

The first objective of the study was to establish the influence of access to credit facilities on the growth of small-scale dairy farming in Githunguri Constituency, Kiambu County. Respondents were asked the extent at which the following factors influence growth of small-scale dairy farming in Githunguri Constituency.

4.5.1 Accessibility of credit facilities among farmers

Table 4.10: Accessibility of credit facilities among farmers

Statement	Frequency	Percentage	Mean	Std. Deviation
Readily available	50	58	2.8372	.37097
Rare	37	42	2.7442	.48961
Total	87	100	5.5814	.86058

Source: Survey Data (2015)

The study findings in Table 4.10 show that a majority of the respondent 50, (58%) were in agreement that credit facilities were available while 37, (42%) pointed out that credit facilities are rare. This disparity could be brought about by the proximity between a farmer and financial institutions that are providing credit services.

4.5.2 Farmers who would take up a loan

Table 4.11: Farmers who would take up a loan

Statement	Frequency	Percentage	Mean	Std. Deviation
Yes	73	83.9	3.1628	.47372
No	14	16.1	3.0465	.34548
Total	87	100	6.2093	.81920

Source: Survey Data (2015)

Table 4.11 shows findings on if farmers would take up a loan to help expand their farming potential, 73, (83.9%) of the respondents agreed that they would take loan, while 14, (29.1%) declined to the statement.

4.5.3 Amount in Kshs that a farmer would borrow

Table 4.12: Amount in Kshs that a farmer would borrow

Amount in KShs	Frequency	Percent	Mean	Std. Deviation
50,000-100,000	19	21.8	2.9302	.43269
100,000-250,000	15	17.2	3.0000	.38680
251, 000-500,000	18	20.7	3.4419	.29589
Above 500,000	21	24.2	2.9302	.43269
None	14	16.1	3.0000	.38680
Total	87	100	15.3023	1.98437

Source: Survey Data (2015)

From Table 4.12, 19, (21.8%) of the respondents agreed that they can take a loan of between 50,000 and 100,000; 15, (17.2%) were of the opinion that they could borrow credit between 100,000 and 250,000; 18, (20.7%) pointed out that they can borrow a figure of between 251,000 and 500,000 while another population of 21, (24.2%) of the respondents believed they could borrow a figure above 500,000. However, 14, (16.1%) of the respondents agreed that they are not interested in borrowing credit for any undertaking in farming at the moment.

4.5.4 Bank Interests Rates

Table 4.13: Experience of Bank Interests to Farmers

Statement on Bank Interests Rates	Frequency	Percent	Mean	Std. Deviation
High	54	62.1	3.4419	3.4419
Moderate	33	37.9	3.3953	3.3953
Total	87	100		

Source: Survey Data (2015)

From Table 4.13, 54, (62.1%) of the respondents agreed that bank interest rates are too high, however, 38.2, (37.9%) of the population said the bank interest rates are moderate. There were no respondents who mentioned low interest rate.

4.6 Access to Market and its influence on Growth of Small-scale Dairy Farming

The second objective of the study was to examine the influence of access to market influence on the growth of small-scale of dairy farming in Githunguri Constituency, Kiambu County.

4.6.1 Accessibility of market for farmers produce

Respondents of the study were asked to indicate the extent at which they quick access to market their milk. The table below shows the research findings.

Table 4.14: Accessibility of market for farmers produce

Market Accessibility	Frequency	Percent	Mean	Std. Deviation
Very accessible	19	21.8	3.0930	.31760
Fairy accessible	42	48.3	3.3488	.38604
Not Accessible	26	29.9	3.4186	.36306
Total	87	100		

Source: Survey Data (2015)

From Table 4.14; 19, (21.8%) of the respondents agreed that the market for farm produce is very accessible; 42, (48.3%) of the population agreed that it's fairly accessible while another population of 26, (29.9%) of the respondents agreed that the market is not accessible.

4.6.2 Preferred Mode of Selling and Marketing Milk

Table 4.15: Preferred Mode of Selling and Marketing Milk

Preferred Mode of Selling Milk	Frequency	Percent	Mean	Std. Deviation
Neighbors	3	3.4	2.9302	.23269
Hotels	22	25.3	3.0000	.28680
Dairy Milk collectors	46	52.9	3.4419	.39589
Local vendors	16	18.4	3.2558	.38961
Total	87	100		

Source: Survey Data (2015)

From Table 4.15; 3, (3.4%) of the respondents agreed that they sell their milk to neighbours; 22, (25.3%) were of the opinion that they prefer selling their milk to hotels; a

substantial population of 46, (52.9%) pointed out that they prefer selling their milk to Dairy Milk collectors while another population of 16, (18.4%) of the respondents prefer selling their milk to local vendors.

4.7 Extension Services and its influence on Growth of Small-scale Dairy Farming

The third objective of the study was to assess the influence of extension services on the growth of small-scale dairy farming in Githunguri Constituency, Kiambu County.

4.7.1 The relation between extension officers and farmers

Table 4.16: Meet With Extension Officers

Meet With Extension Officers	Frequency	Percent	Mean	Std. Deviation
Often	18	20.7	2.9302	.30357
Less often	40	46.0	3.4419	.29589
Very often	3	3.4	3.3953	.35971
Never	26	29.9	3.628	.885
Total	87	100		

Source: Survey Data (2015)

From Table 4.16; 18, (20.7%) of the respondents agreed that they often meet with extension officers; 40, (46.0%) of the population agreed they less often meet with extension officers while another population of 3, (3.4%) of the respondents argued that they quite often met the extension officers and 26, (29.9) never met with them.

4.7.2 The type of extension service providers available

Table 4.17: Service Providers of Extension Services

Service Providers of Extension Services	Frequency	Percent	Mean	Std. Deviation
Public	52	59.8	3.3953	.25971
Private	35	40.2	3.0930	.31760
Total	87	100		

Source: Survey Data (2015)

From Table 4.17; 52, (59.8.3%) of the respondents pointed out that they get service providers of extension officers from the government, while 35, (40.2%) of the population said prefer hiring private officers for extension services.

4.7.3 The frequency contact between extension Officers and dairy farmers

Table 4.18: Frequency of Contact between Extension Officers and Dairy Farmers
Std.

Frequency of Contact	Frequency	Percent	Mean	Deviation
Weekly	3	3.4	2.9302	.34548
Monthly	22	25.3	3.0465	.43269
Not consistent	36	41.3	3.4419	.38680
Never	26	29.9	3.0000	.29589
Total	87	100		

Source: Survey Data (2015)

From Table 4.18; 3, (3.4%) of the respondents agreed that they meet extension officers on a weekly basis; 22, (25.3%) pointed out that they meet extension officers on a monthly basis; a population of 36, (41.3%) pointed out that their meeting with extension officers is not consistent while another population of 26, (29.9%) of the respondents argued that they have never met the extension officers.

4.8 Entrepreneurial skills and its influence on Growth of Small-scale Dairy Farming

The fourth objective was to establish the influence of farmer's entrepreneurial skills on the growth of small-scale dairy farming in Githunguri constituency, Kiambu County.

4.8.1 Famers with business strategy

Table 4.19: Famers with business strategy

Gender	Frequency	Percentage	Mean	Std. Deviation
Yes	50	58	3.3953	.25971
No	37	42	3.0930	.31760
Total	87	100		

Source: Survey Data (2015)

The study findings in Table 4.19; show that a majority of the respondent 50, (58%) agreed that they have a business strategy while 37, (42%) did not. The study findings indicate that majority of the farmers have entrepreneurial skills.

4.8.2 Networking and utilization of contacts by the dairy farmers

Table 4.20: Networking and utilization of contacts

Networking and utilization of contacts	Frequency	Percent	Mean	Std. Deviation
Good	49	56.3	3.0930	.31760
fair	33	37.9	3.3488	.38604
poor	5	5.8	3.4186	.36306
Total	87	100		

Source: Survey Data (2015)

From Table 4.20; 49, (56.3%) of the respondents agreed that they have good networking and utilization of contacts; 33, (37.9%) of the population agreed the networking and utilization was fair while another population of 5, (5.8%) of the respondents believe that their networking and utilization was poor.

4.8.3 Recognition and realization of opportunities by the dairy farmers

Table 4.21: Recognition and realization of opportunities

Recognition and realization of opportunities	Frequency	Percent	Mean	Std. Deviation
Good	49	56.3	3.0000	.28680
Fair	38	43.7	3.4419	.39589
Total	87	100		

Source: Survey Data (2015)

From Table 4.21; 49, (56.3%) of the respondents agreed that they have a good recognition and realization of opportunities; 38, (43.7%) of the population agreed that their recognition and realization of opportunities is fair.

4.9 Statistical Analysis

The study aimed to determine how access to credit, access to market, extension services and entrepreneurial skills influences the growth of small-scale dairy farming. The study employed parametric statistical tests hence indices were developed to benchmark the threshold values to determine the extent of the growth of small-scale dairy farming.

Table 4.22: Means, Median, Mode, Standard Deviations, Skewness, and Variation of Independent Variables

Dependent variable	Mean	Median	Mode	Std. deviation	Skewness	Variance
access to credit	2.75	2.8	3	.335	3.4419	.23269
access to market	2.776	2.853	3	.336	3.2558	.28680
extension services	2.154	2.045	2.5	.256	2.9302	.39589
entrepreneurial skills	2.704	2.946	3	.332	3.4419	.38961

Source: Survey Data (2015)

From Table 4.22; credit access and access to market had similar mean of 2.7 and a mode and median of 2.8, standard deviation of 0.33. For market access, 69.4% had access. Entrepreneurial skills had a mean of 2.704, median and mode of 3 and a variation was 0.38961. The aggregate score for independent variables ranged from 2.5 to 4. Respondents who scored above the mean were about 50.6%. 5.6% of respondents scored the maximum (4). This scenario suggests that about a half of the respondents were above the mean and the growth of small-scale farming was about 50% established.

4.9.1 The relationship between access to credit and growth of small-scale dairy farming

The first research question was to what extent access to credit influences the growth of small-scale dairy farming in Githunguri. The means of the five domains of the growth small-scale dairy farming were computed and correlated with the mean responses to access to credit. Table 4.23; indicates the model summary between access to credit and growth of small-scale dairy farming.

Table 4.23: Relationship between access to credit and growth of small-scale dairy farming
Model Summary

Model	R	R Square	Adjusted Square	R Std. Error of the Estimate
1	.853	.728	.635	.60296

a. Predictors: (Constant), Access to credit

b. Dependent Variable: Growth of small-scale dairy farming

Analysis in Table 4.23; shows that the coefficient of determination (the percentage variation in the dependent variable being explained by the changes in the independent variables) R^2 equals 0.728 that is, explained access to credit 72.8 percent of growth of small-scale dairy farming.

Table 4.24: Analysis of Variance

Model		Sum	of			
		Squares	df	Mean Square	F	Sig.
1	Regression	78.897	1	78.897	217.010	.000 ^a
	Residual	67.986	86	.364		
	Total	146.884	87			

a. Predictors: (Constant), Access to credit

b. Dependent Variable: Growth of small-scale dairy farming

The summary of the basic logic of ANOVA is the discussion of the purpose and analysis of the variance. The purpose is to test differences in means (for groups or variables) for statistical significance. The ANOVA analysis intended to investigate whether the variation in the independent variables explain the observed variance in the outcome in this study the outcome of growth of small-scale dairy farming. The F-Statistics produced ($F = 217.01$) was significant at 0 per cent level ($\text{Sig. } F < .000$) thus confirming the fitness of the model. Since the P value is less than 0.05, therefore the access to credit has positive significant influence on growth of small-scale dairy farming.

Table 4.25: Pearson's Coefficients of Correlation

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
P	(Constant)	1.304	.209		6.230	.000	.891	1.717
	Access to credit	.013	.062	.733	14.731	.000	.630	.825
a. Predictors: (Constant), Access to credit								
b. Dependent Variable: Growth of small-scale dairy farming								

The variables were regressed by comparing the means of the access to credit and the means of the growth of small-scale dairy farming variables by use of ANOVA. Table 4.25; indicates that one unit change in Access to credit results in 0. 013 units increase in Growth of small-scale dairy farming.

4.9.2 The relationship between access to market and growth of small-scale dairy

The second research question was to what extent access to market influence the growth of small-scale dairy farming in Githunguri. The means of the five domains of the growth small-scale dairy farming were computed and correlated with the mean responses to access to market. Table 4.26; indicates the summary relationship between access to market and growth of small-scale dairy farming.

Table 4.26: Relationship between access to market and Growth of small-scale dairy farming

Model Summary

Model	R	R Square	Adjusted Square	R Std. Error of the Estimate
1	.778	.605	.570	.72348

a. Predictors: (Constant), Access to market

b. Dependent Variable: Growth of small-scale dairy farming

Analysis in Table 4.26 shows that the coefficient of determination (the percentage variation in the dependent variable being explained by the changes in the independent variables) R^2 equals 0.605 that is, explained access to market 60.5 percent of Growth of small-scale dairy farming.

Table 4.27: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	49.004	2	49.004	93.621	.000
	Residual	97.880	85	.523		
	Total	146.884	87			

a. Predictors: (Constant), Access to market

b. Dependent Variable: Growth of small-scale dairy farming

The ANOVA results indicate that the independent variables significantly ($F=93.621$, $p=0.000$) explain the variance in growth of small-scale dairy farming. In this context, as have been presented in Table 4.27; the dependent variable is the level of growth of small-scale dairy farming while the independent or the predictor is access to market. R^2 equals 0.605, that is, only 39.5 percent of relevance of access to market is unexplained. The P-value of 0.000 (Less than 0.05) implies that the model of access to market on growth of small-scale dairy farming is significant at the 95% confidence level.

Table 4.28: Pearson's Coefficients of Correlation

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.309	.316		4.148	.000	.686	1.931
	Access to market	.421	.073	.578	9.676	.000	.564	.853

a. Predictors: (Constant), Access to market

b. Dependent Variable: Growth of small-scale dairy farming

In Table 4.28; the Coefficients explains the change in growth of small-scale dairy farming with effect to change in access to market. One unit change in Access to market will lead to 0.421 changes in growth of small-scale dairy farming.

4.9.3 The relationship between extension services and growth of small-scale dairy farming

The third research question was to what extent extension services influences the growth of small-scale dairy farming in Githunguri. The means of the five domains of the growth small-scale dairy farming were computed and correlated with the mean responses to extension services. Table 4.24; indicate the model summary between extension services and growth of small-scale dairy farming.

Table 4.29: Model Summary

Model		R	R Square	Adjusted R Square	Std. Error of the Estimate
dimension	1	.353	.488	.635	.30296

a. Predictors: (Constant), Extension services

Analysis in Table 4.29; shows that the coefficient of determination (the percentage variation in the dependent variable being explained by the changes in the independent variable) R^2 equals 0.488 that is, explained the extension services 48.8 percent of growth of small-scale dairy farming leaving 51.2 percent unexplained. The P- value of 0.000 (Less than 0.05) implies that the model of growth of small-scale dairy is significant at the 5 percent significance.

Table 4.30: Analysis of Variance

Model		Sum of Squares	df	Mean Square F		Sig.
1	Regression	48.876	7	48.876	16.377	.000 ^a
	Residual	23.466	81	.091		
	Total	9.442	87			

a. Predictors: (Constant), Extension services

b. Dependent Variable: Growth of small-scale dairy

ANOVA findings (P- value of 0.00) in Table 4.30; show that there is relationship between the predictor's variable (Extension services) and response variable (Growth of small-scale dairy). An F ratio is calculated which represents the variance between the groups, divided by the variance within the groups. F ratio (16.377) indicates that there is a less variability between the groups (caused by the independent variable) than there is within each group, referred to as the error term. The P value is 0.000 which is less than 0.005 significance level. Since the P value is less than 0.05, therefore extension services has positive significant influence on growth of small-scale dairy farming.

Table 4.31: Pearson's Coefficients of Correlation

Model		Unstandardized		Standardized		Sig.
		Coefficients		Coefficients		
		B	Std. Error	Beta	t	
1	(Constant)	2.463	.705		8.746	.000
	Growth of small-scale dairy	.297	.081	.356	.230	.000

a. Dependent Variable: Growth of small-scale dairy

The established multiple linear regression equation becomes:

$$Y = 6.165 + 0.297X_1$$

In table 4.31; Extension services has $\beta = 0.297$, $t = 0.230$, $p < .000$. this indicate that one unit change in Extension services results in 0.297 units increase in Growth of small-scale dairy farming Extension services; therefore extension service has a weak positive significance on Growth of small-scale dairy

4.9.4 The relationship between farmers' entrepreneurial skills and growth of small-scale dairy farming

The fourth research question was the role of entrepreneurial skills in the growth of small-scale dairy farming in Githunguri. Table 4.32; indicates the role of entrepreneurial skills and growth of small-scale dairy farming.

Table 4.32: Model Summary of Entrepreneurial skills and Growth of Small-scale dairy farming

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
dimension0 1	.984 ^a	0.968	0.962	0.12473

Predictors: (*Constant*), Entrepreneurial skills

Dependent Variable: growth of small-scale dairy farming

Analysis in Table 4.32; shows that the coefficient of determination (the percentage variation in the dependent variable being explained by the changes in the independent variables) R^2 equals 0.968^a, that is, Entrepreneurial skills leaving only 3.2 percent unexplained. The P- value of 0.000 (Less than 0.05) implies that the model of growth of small-scale dairy farming is significant at the 5 percent significance.

Table 4.33: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23.256	8	2.907	186.849	.000 ^a
	Residual	.778	50	.016		
	Total	24.034	58			

a. Predictors: (*Constant*), Entrepreneurial skills

b. b. Dependent Variable: growth of small-scale dairy farming

ANOVA findings (P- value of 0.00) in Table 4.33; shows that there is relationship between the predictor variable (Entrepreneurial skills) and response variable (growth of small-scale dairy farming). $F=186.849$, $p=0.000$ explain the variance in growth of small-

scale dairy farming. In this context, as have been presented in the table, the dependent variable is the level of growth of small-scale dairy farming.

Table 4.34: Pearson's Coefficients of Correlation

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.772	.362		2.133	.038
	Growth of	.138	.116	.143	1.188	.240
	Small-Scale Dairy Farming					

In determining the strength of the relationship between Entrepreneurial skill variables, in order to forecast growth of small-scale dairy farming Table 4.34; $Y = 0.772 + 0.138X_2$, shows that one unit change in Entrepreneurial skills results in 0.138 units increase in Growth of small-scale dairy farming.

4.9.5 Summary of relationship between the dependent variable and independent variables

The summary of the relationship between the growth of small-scale dairy farming and the access to credit, access to market, extension services and entrepreneurial skills is as given in Table 4.35;

Table 4.35: Distribution of Coefficients

			Growth of small- scale dairy farming	Access to credit	Access to market	Extension services	Entrep reneur ial skills
Pearson	Growth	of	1.000				
Correlatio	small-scale						
n	dairy						
	farming						
	Access	to	.594	1.000			
	credit						
	Access	to	.657	.749	1.000		
	market						
	Extension		.718	.815	.962	1.000	
	services						
	Entrepreneur		.594	1.000	.749	.815	1.000
	ial skills						

** Significant at 0.001 Source: Survey Data (2015)

The correlation coefficient can range from -1 to +1, with -1 indicating a perfect negative correlation, +1 indicating a perfect positive correlation, and 0 indicating no correlation at all. The Correlation matrix is used to determine the extent to which changes in the value of an attribute (such as Access to credit) is associated with changes in another attribute (entrepreneurial skills). The data for a correlation analysis consists of two input columns. Each column contains values for one of the attributes of interest. When the values are greater than 0.5 then the variables are correlated and when values are less than -0.5 then the values for are not correlated.

Table 4.35 shows that there is high positive correlation of growth of small-scale dairy farming against Access to credit, Access to market, Entrepreneurial skills and extension services.

Table 4.36: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. Change
1	.497	.530	.805	.51038	.530	31.184	3	84	.000

Source: Researcher 2015

Predictors: (Constant), Access to credit, Access to market, Extension services, Entrepreneurial skills

Dependent Variable: Growth of small-scale dairy farming. The R^2 (53%) indicates. R^2 equals 0.805, that is, access to credit, access to market, extension services, entrepreneurial skills only 19.5 percent unexplained.

Table 4.37: Analysis of Variance

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7.565	3	2.522	31.184	.000 ^b
	Residual	6.711	84	.081		
	Total	14.276	86			

a. Predictors: (Constant), Access to credit, Access to market, Extension services, Entrepreneurial skills

b. Dependent Variable: Growth of small-scale dairy farming

The ANOVA results in Table 4.37; indicate that the independent variables significantly ($F=31.184$, $p=0.00$) explain the variance in the firm growth of small-scale dairy farming. In this context, as have been presented, the dependent variable is the level of acceptance of growth of small-scale dairy farming while the independent or the predictors are access to credit, access to market, extension services, entrepreneurial skills. The P- value of 0.001 (Less than 0.05) implies that the model of growth of small-scale dairy farming is significant at the 95% confidence level.

Table 4.38: Pearson's Coefficients of Correlation

Model	Unstandardized		Standardized		
	Coefficients		Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	.738	.143		5.172	.000
Access to credit	.650	.211	.079	.308	.000
Access to market	.556	.160	1.168	1.603	.113
Extension services	.422	.116	.019	3.628	.000
Entrepreneurial skills	.516	.109	.452	.145	.885

a. Dependent Variable: Growth of small-scale dairy farming

Table 4.38; present the values for the regression equation for predicting the dependent variable from the independent variables.

The regression equation is presented below.

Regression equation:

$$Y = 0.738 + 0.65X_1 + 0.556X_2 + 0.422X_3 + 0.516X_4$$

Y= Growth of small-scale dairy farming

X₁ = Access to credit

X₂ = Access to market

X₃ = Extension services

X₄ = Entrepreneurial skills

α = constant

β = coefficient

ε = error term

Where

Constant = .738, shows that if Access to credit, Access to market , Extension services , Entrepreneurial skills all rated as zero, Growth of small-scale dairy farming would be 0.738

X₁ = 0.650, shows that one unit Access to credit results in 0.65 units increase in Growth of small-scale dairy farming

X₂ = 0.556, shows that one unit change Access to market results in 0.556 units increase in Growth of small-scale dairy farming

$X_3 = 0.422$, shows that one unit change in Extension services results in 0.422 units increase in Growth of small-scale dairy farming

$X_4 = 0.516$, shows that one unit change in Entrepreneurial skills results in 0.516 units increase in Growth of small-scale dairy farming.

The study found out that access to credit, access to market, entrepreneurial skills, and extension services in that order of reducing importance, influenced growth of small-scale dairy farming in Githunguri. The study identified that creativity and product development in entrepreneurial skills influenced growth of enterprise to a great extent.

The study established that farmers have difficulties in accessing credit facilities. The study established that access to market in terms enables the enterprise increase their sales volumes, it also enables organization to access right inputs, favorable prices and also establish distribution chains. From the regression analysis the following regression equation was formulated; $Y = 0.738 + 0.65X_1 + 0.556X_2 + 0.422X_3 + 0.516X_4$. The regression analysis has shown that access to market contributes most to growth of small-scale dairy farming in Githunguri, followed by access to credit, entrepreneurial skills and extension services.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the key study findings, discussions, conclusions and recommendations. It also makes suggestions for further research. The findings are summarized in line with the objectives of the study which was to examine the factors that influence the growth of small-scale dairy farming practice in Githunguri constituency. The study sought to determine how access to credit facilities influences the growth of small-scale dairy farming in Githunguri Constituency, Kiambu County, to examine how access to market influences the growth of small-scale dairy farming in Githunguri Constituency, Kiambu County, to establish how extension services influence the growth of small-scale dairy farming in Githunguri Constituency, Kiambu County and to examine how farmers entrepreneurial skills influence the growth of small-scale dairy farming in Githunguri Constituency, Kiambu County.

5.2 Summary of findings

5.2.1 Influence of Access to Credit on Small-scale Dairy Farming

The study found out that for the small and micro dairy farmers rely a lot in access to financial services, especially to boost the operations in the farms for buying feeds, milking machines and to expand in other areas. R^2 equals 0.728 that is, explained access to credit 72.8 percent of growth of small-scale dairy farming. Although small farmers may have problems securing access to credit if they are located in remote areas that are not served by traditional financial institutions. Access to credit was found to have

positive influence on growth establishments of auxiliary financial institutions in the region of the study.

5.2.2 Influence of Access to Market on Small-scale Dairy Farming

The study deduces that access to markets through opening new markets for milk and milk products, enhancing the existing markets to increase markets share, assuring farmers of markets to their milk and milk products will highly contribute and encourage dairy farmers to concentrate and do dairy farming in big way. R^2 equals 0.605 that is, explained access to market 60.5 percent of Growth of small-scale dairy farming.

5.2.3 Influence of Extension Services on Small-scale Dairy Farming

The study found out that extension services is really wanting, provision of dairy information to the dairy farmers leads to farmers doing activities differently. R^2 equals 0.488 that is, explained the extension services 48.8 percent of growth of small-scale dairy farming leaving 51.2 percent unexplained. Extension is therefore a critical change agent for livestock production. It is also useful in transforming subsistence livestock farming to modern and commercial livestock activity. This is an important ingredient in promoting household food security, improving incomes and poverty reduction. Governments (both at county and national level) also need to play a great role in ensuring that extension services is provided to the people.

5.2.4 Influence of Farmers Entrepreneurial skills on Small-scale Dairy Farming

On entrepreneurship skills, the study found out that the skills, knowledge gained from the entrepreneurship training lead to the growth of dairy farming. R^2 equals 0.968, that is, Entrepreneurial skills leaving only 3.2 percent unexplained. The ability of smallholder

milk producers to participate in the dairy market in a profitable manner depends not only on their own competitiveness, mainly determined by their production costs, but also on the efficiency of the dairy chains to which they belong.

5.3 Discussion of the Findings

5.3.1 Access to Credit

The study found out that for the small and micro dairy farmers rely a lot in access to financial services, 83.9% of the respondents agreed that they would take loan to expand their farming potential. Although a significant number of respondents agreed that bank interest rates are too high, it did not affected the fact that access to credit is still a requirement for a fundamental growth of small scale farming in Githunguri. This is in agreement with a study by Eswaran and Kotwal, (1990) that having access to credit may reduce household vulnerability to negative shocks by increasing their ability to smooth consumption during difficult times, and that availability of credit also allows households to undertake riskier investments as it will enable them to better deal with the consequences of poorly performing investments. In addition, (Deaton,1991) argues that by reducing the financial risks faced by households in this way, access to financial services may decrease the proportion of low-risk, low-return assets held by households for precautionary purposes (such as jewellery), and enable them to invest in potentially higher risk but higher return assets, (such as education or a rickshaw), with overall long-term income enhancing impacts.

5.3.2 Access to Market

On access to markets, the study deduces that access to markets through existing and opening new markets for milk, enhancing the existing markets to increase markets share, assuring farmers of markets to their milk and milk products highly contribute and encourage dairy farmers to practice dairy farming. Infrastructure such as rural access roads, and water and rural electricity supplies have a major influence on milk marketing efficiency and are perhaps the most limiting factors to the development of the smallholder dairy. This is in agreement with Amrouk, (2013) who supports that access to markets for smallholder farmers without separating their definition from market participation, to which they believe, implies the transition from subsistence farming to a market engagement mode, with frequent use of markets for the exchange of products and services

5.3.3 Extension Services

The study also found out that extension services is really wanting, provision of dairy information to the dairy farmers leads to farmers doing activities effectively. Extension is therefore a critical change agent for livestock production. It is also useful in transforming subsistence livestock farming to modern and commercial livestock activity. This is in line with KARI, (1999) report which argued that extension services bring scientific knowledge to farmers so that they improve efficiency in their activities. Lack of knowledge and technical know-how therefore largely affects smallholders capability to manage their farms as 'enterprises' also Poor access to support services; farmers in developed countries have access to support services ranging from production and marketing advice to support in family issues, which enables them to focus on what they

do best and to buy-in the knowledge and skills they lack. Such services are usually lacking in developing countries or are difficult for small-scale farmers to gain access to.

5.3.4 Entrepreneurial Skills

On entrepreneurship skills, the study found out that the skills, knowledge gained from the entrepreneurship networking lead to the growth of dairy farming. The ability of smallholder milk producers to participate in the dairy market in a profitable manner depends not only on their own competitiveness, mainly determined by their production costs, but also on the efficiency of the dairy chains to which they belong. A study by Kodithuwakku and Rosa, (2002) found that there were clear differences in the economic successes among the farmers, the results showed successful farmers were better able to mobilize resources through social networks and they were pursuing multiple opportunities. Therefore successful farmer-entrepreneurs are technically competent, innovative and plan ahead so they can steer their farm businesses through the stages of enterprise development from establishment and survival to rapid growth and maturity.

5.4 Conclusions of the Study

From the study findings we can conclude the following:

5.4.1 Access to Credit

On access to credits, the study concludes that for the small-scale dairy farmers rely a lot in access to financial services, especially to enhance their farm operations and to expand in other dairy practice areas.

5.4.2 Access to Markets

On access to markets, the study deduces that access to markets through functioning markets for milk and milk products, enhancing the existing markets to increase markets

share, assuring farmers of markets to their milk and milk products highly contribute and encourage dairy farmers to concentrate and practice dairy farming.

5.4.3 Extension Services

The study concludes that extension services are really wanting, provision of dairy information to the dairy farmers leads to farmers doing activities productively. Governments (both at County and National level) also need to play a great role in ensuring that extension services is provided to the people.

5.4.4 Entrepreneurial Skills

On entrepreneurship skills, the study concludes that the skills, knowledge gained from the entrepreneurial behavior lead to the growth of dairy farming in the study area.

5.6 Recommendations of the Study

From the findings and conclusion of the study, the study recommends

1. The study recommends that for dairy farmers to realize improved growth, provision and access to credit from financial services providers should be encouraged to ensure that small-scale dairy farmers are confident to approach financial institutions for facilities.
2. The dairy farmers should have a lot of information on the terms and conditions of various financial services providers.
3. Recommends that dairy farmers in small-scale dairy farming and stakeholders in the dairy industry should be more vibrant in establishing linkages and access to markets in the dairy value chain to promote the growth of their dairy farming enterprises.

4. The study further recommends that small-scale dairy farmers should do more networking among their peers even out of the County to catch up with what is happening within the network of dairy industry. When small-scale dairy farmers are informed on the market trend they will use the information to advance their dairy farming.

5.7 Suggestions areas for further Research

There are other factors that influence the growth of small-scale dairy farming that need to be investigated. These are factors such as environment conditions, social-cultural factors feeding and pests and disease control. There is need to investigate why farmers are not achieving their optimal standards despite access to credit, access to market, extension services and entrepreneurial skills.

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APPENDICES

APPENDIX I: LETTER OF TRANSMITTAL

Lilian Wanjiku Githiora,
P.O Box 1574-00900
Kiambu,

4th May, 2015

Dear Respondent,

**RE: FACTORS INFLUENCING THE GROWTH OF SMALL-SCALE
DAIRY FARMING: A CASE OF GITHUNGURI CONSTITUENCY,
KIAMBU COUNTY, KENYA**

I am a Master's student at the School of Continuing and Distance Education, University of Nairobi currently conducting a research study as entitled above.

I wish to inform that you have been selected as one of the respondents to assist in providing the essential data and information for this activity. I kindly request you to spare a few minutes and answer the attached questionnaire. The information obtained will be used for academic purposes only, will be treated with utmost confidentiality and will not be shared with anyone whatsoever. Do not write your name anywhere on the questionnaire.

I therefore plead you to respond to all questions with utmost honesty.

Thank you, most sincerely for your support.

Yours Sincerely,

Lilian Wanjiku Githiora

APPENDIX II: LETTER OF INTRODUCTION



UNIVERSITY OF NAIROBI
COLLEGE OF EDUCATION AND EXTERNAL STUDIES
SCHOOL OF CONTINUING AND DISTANCE EDUCATION
DEPARTMENT OF EXTRA-MURAL STUDIES
NAIROBI EXTRA-MURAL CENTRE

Your Ref:

Our Ref:

Telephone: 318262 Ext. 120

Main Campus
Gandhi Wing, Ground Floor
P.O. Box 30197
NAIROBI

7th May, 2015

REF: UON/CEES//NEMC/21/106

TO WHOM IT MAY CONCERN

RE: GITHIORA LILIAN WANJIKU - REG NO - L50/61282/2013

This is to confirm that the above named is a student at the University of Nairobi, College of Education and External Studies, School of Continuing and Distance Education, Department of Extra- Mural Studies pursuing Master of Arts in Project Planning and Management.

She is proceeding for research entitled "**factors influencing the growth of small-scale dairy farming**" A case of Githunguri constituency, Kiambu County, Kenya.

Any assistance given to her will be appreciated.

CAREN AWILLY
CENTRE ORGANIZER
NAIROBI EXTRA MURAL CENTRE



APPENDIX III: QUESTIONNAIRE TO DAIRY FARMERS

Questionnaire number..... Date issued.....

I am a student at the University of Nairobi pursuing Master of Arts in Project Planning and Management. I am conducting a research factors influencing the growth of small scale dairy farming in Githunguri, Kiambu County.

I hereby request for your assistance in terms of providing me with relevant information. *(Kindly mark/tick appropriately, fill in the spaces/bracket provided to all the questions. The responses will be treated as confidential).*

Section A: Respondent's Background Data

Particulars

1. Name of Respondent(optional).....
2. What is your gender? ☐ Male ☐ Female
3. What is your age bracket? ☐ 20-30 ☐ 30-40 ☐ Above 40
4. What is your highest level of education?

PhD	☐
Masters	☐
Bachelors	☐
Diploma	☐
Certificate	☐
Did not attend school	☐

Section B: Credit Access and Growth of Small-Scale Dairy Farming

5. Are credit facilities in your area that help dairy farmers?
Readily available ☐ Rare ☐
5. Would you take up a loan to help expand your farming potential?
Yes ☐ No ☐
7. What amount would you be comfortable to borrow from a credit facility (in KShs)?

50,000-100,000	☐	100,000-250,000	☐	251, 000-500,000	☐
Above 500,000	☐	None	☐		

8. From your own experience what can you say are the bank interests to farmers
High ☐ Moderate ☐ Low ☐

SECTION C: Access to Market and Growth of Small-Scale Dairy Farming

9. Do you have a quick access to market your milk?

Very accessible ☐ Fairy accessible ☐ Accessible ☐
Not accessible

10. Which is your preferred mode of marketing your milk?

Neighbors ☐ Hotels ☐ Dairy Milk collectors ☐ Local ☐
vendors

Section D: Extension Services and Growth of Small-Scale Dairy Farming

12. How often do you meet with extension officers?

Very often ☐ Often ☐ Less often ☐ Never ☐

14. What are the common service providers of extension services?

Public ☐ Private ☐

13. What can you say is your frequency contact with extension services in this area?

Weekly ☐ Monthly ☐ Not consistent ☐ Never ☐

Section E: Entrepreneurial skills and Growth of Small-Scale Dairy Farming

15. Do you have a business strategy?

Yes ☐ NO ☐

15 b. If yes do you evaluate it?

Rarely ☐ Often ☐ never ☐

16. What can you say about your ability to network and utilising contacts?

Good ☐ fair ☐ poor ☐

17. Are you able to recognize and realise opportunities?

Good ☐ Fair ☐ poor ☐

Section F: Growth of Small-Scale Dairy farming

18. What is the main reason of keeping dairy cattle's?

Hobby ☐ Income ☐ Family consumption ☐

19. How many dairy cattle do you have?

1-3 ☐ 4-6 ☐ 7-9 ☐ 10 and above ☐

20. How many litres of milk in total do you produce in a day?

1-5 ☐ 6-10 ☐ 11-15 ☐ 16 and above ☐

21. What can you say is the cow mortality rate?

Very High ☐ High ☐ Low ☐ Very low ☐

22. Cause of cow mortality rate.

Lameness or injury ☐ ☐ mastitis

Calving problems ☐ ☐ unknown reasons

23. What is your monthly household earnings from milk production per month?

5000-10000 ☐ 11000- 15000 ☐ 16000-20000 ☐

Above 20,000 ☐

Thank you for Cooperation

APPENDIX IV: RESEARCH QUESTIONNAIRE TO AGRICULTURAL OFFICERS

Questionnaire number Date issued.....

I am a student at the University of Nairobi pursuing Master of Arts in Project Planning and Management. I am conducting a research on I am conducting a research factors influencing the growth of small scale dairy farming in Githunguri, Kiambu County

I hereby request for your assistance in terms of providing me with relevant information.

(Kindly mark/tick in the appropriately, fill in the spaces/bracket provided to all the questions. The responses will be treated as confidential).

Section A: Respondent's Background Data

1. Particulars

Name of Respondent (optional).....

What is your gender? Male ☐ Female ☐

2. What is your age bracket? 30-40 ☐ Above 40 ☐

3. What is your highest level of education?

PhD ☐

Masters ☐

Bachelors ☐

Diploma ☐

Section B: Access to Credit

24. Dairy farmers easily have access to credit

strongly disagree ☐ disagree ☐ agree ☐ strongly agree ☐

Section C: Access to Market

25. What do you think is the current status of market accessibility in this area

Well-developed ☐ Fairly developed ☐ developed ☐ Not developed ☐

Section D: Extension Services

26. Farmers readily access extension services

Strongly disagree ☐ disagree ☐ Agree ☐ strongly agree ☐

Section E: Farmers entrepreneurial skills

27. Do you think good entrepreneurial skills of farmers directly influence dairy farming practices in this area

Strongly disagree ☐ Disagree ☐ agree ☐ strongly agree ☐

Section F: Growth of small-scale dairy farming

27. What is the level of cow mortality rate in this area?

High ☐ Moderate ☐ Low ☐

Thank you for Cooperation

APPENDIX V: TABLE FOR DETERMINING SAMPLE SIZE FOR A GIVEN POPULATION

Table for Determining Sample Size for a Given Population									
N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: "N" is population size
"S" is sample size.

Source: Krejcie & Morgan, 1970

APPENDIX VI: RESEARCH PERMIT

THIS IS TO CERTIFY THAT:
MISS. LILIAN WANJIKU GITHIORA
of UNIVERSITY OF NAIROBI, 0-900
Kiambu, has been permitted to conduct
research in Kiambu County

on the topic: FACTORS INFLUENCING
THE GROWTH OF SMALL-SCALE DAIRY
FARMING: A CASE OF GITHUNGURI
CONSTITUENCY, KIAMBU COUNTY
KENYA.

for the period ending:
6th November, 2015


.....
Applicant's
Signature

Permit No : NACOSTI/P/15/8593/6167
Date Of Issue : 30th June, 2015
Fee Received :Ksh 1,000




.....
for Director General
National Commission for Science,
Technology & Innovation